

# Remote Sensing of Tropical Forests with Multi-Frequency Polarimetric Radar (AIRSAR) as an Aid in Vegetation Classification.

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## Abstract:

Vegetation maps of inaccessible areas in the tropics tend to divide vegetation into broad types. For closed forest canopies, optical and infrared methods often cannot separate vegetation types because they are assessing canopy surface reflection properties. Also they are not operational under cloudy conditions as often prevail in the tropics. Radar signals of varying wavelength penetrate atmospheric moisture and forest canopies and allow to extract structural information about the subcanopy and forest floor based on the dominating backscatter mechanisms and changes in polarization of backscatter.

In 1990 and 1993 the Jet Propulsion Laboratory/NASA DC-8 airplane with the Airborne Synthetic Aperture Radar (AIRSAR) on board was flown over the Rio Bravo area in northern Belize, Central America and the Rio Manu area in eastern Peru. The AIRSAR is a three frequency (C-band 56 mm, L-band 230 mm, P-band 670 mm) multi-polarization imaging Radar with a swath size of 12 km and a pixel size of 10 m. Two separate data processors are used in the analysis of AIRSAR data. First the fully polarimetric frame processor for all frequencies and four polarizations for complete polarimetric analysis which is required for scattering mechanism identification and second a three channel strip processor for large mosaic images.

A hierarchical classification technique for vegetation classification in areas with moderate topography is presented together with ground based structural information of the natural vegetation types. Radar is especially useful in separating forests with a high palm component from broadleaf forests, in detecting areas with various natural successional stages and to identify swamp forests and "Bajo" vegetation.

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